

What is Claimed Is:

- 1 1. A multipurpose multifunctional (M/M) interface device, comprising:
 - 2 A. a plurality of communication ports, including:
 - 3 1) one or more system ports configured to couple to a system to be diagnosed;
 - 4 2) one or more diagnostic ports configured to couple to at least one diagnostic
 - 5 system;
 - 6 B. a set of power management modules configured to provide, selectively, power at
 - 7 a full power level and a reduced power level; and
 - 8 C. a main processor module configured to control communications between the
 - 9 system ports and the diagnostic ports, and to selectively transition the M/M interface
 - 10 device between a standby mode at the reduced power level and an operational mode at
 - 11 the full power level.
- 1 2. The device of claim 1, wherein a transition of the M/M device from the standby mode to
- 2 the operational mode is responsive to an occurrence of at least one of a set of power up trigger
- 3 events, wherein the set of power up trigger events includes activity on at least one of the
- 4 diagnostic ports or system ports.
- 1 3. The device of claim 2, wherein the one or more diagnostic ports includes a set of serial
- 2 diagnostic ports and the set of power up trigger events includes activity on at least one of the set
- 3 of serial diagnostic ports.
- 1 4. The device of claim 2, wherein the set of power up trigger events includes a restoration of
- 2 full power.
- 1 5. The device of claim 1, wherein a transition of the M/M device from the operational mode
- 2 to the standby mode is responsive to an occurrence of at least one of a set of power down trigger

3 events, wherein the set of power down events includes inactivity on at least one of the diagnostic
4 ports or system ports for a predetermined period of time.

1 6. The device of claim 5, wherein the set of power down trigger events includes a loss of
2 full power.

1 7. The device of claim 1, wherein the set of power management modules includes a main
2 power module configured to provide the high power level from at least one external power
3 source.

1 8. The device of claim 1, wherein the set of power management modules includes a battery
2 power module configured to provide at least one of the high power level and the reduced power
3 level from at least one internal battery.

1 9. The device of claim 1, wherein the set of power management modules includes a battery
2 charger.

1 10. The device of claim 9, wherein the battery charger is configured to charge a rechargeable
2 battery at a fast rate when the device is coupled to a power source of a voltage about equal to or
3 greater than a voltage rating of the battery, and at a slow rate when the power source is of a
4 voltage substantially less than the voltage rating of the battery.

1 11. The device of claim 9, wherein the battery charger is configured to charge an external
2 battery coupled to the M/M interface device via a power port.

1 12. The device of claim 9, wherein the M/M interface device includes a thermal sensor, and
2 the main processor module varies the charge rate as a function of an internal temperature of the
3 M/M device measured by the thermal sensor.

1 13. The device of claim 1, wherein the set of power management modules is configured to
2 provide power to at least one of the systems to be diagnosed or the diagnostic system.

1 14. The device of claim 1, wherein the main processor module is configured to generate
2 analog signals from digital signals received from the one or more system ports, and to provide
3 the analog signals to at least one diagnostic port.

1 15. A multipurpose multifunctional (M/M) interface device for vehicle diagnostics,
2 comprising:

3 A. a plurality of communication ports, including:

4 1) one or more vehicle system ports configured to couple to at least one vehicle;
5 2) one or more diagnostic ports configured to couple to at least one vehicle
6 diagnostic system;

7 B. a set of power management modules configured to provide a full power level and
8 a reduced power level; and

9 C. a main processor module configured to control communications between the
10 system ports and the diagnostic ports, the main processor module also configured to
11 selectively transition the M/M interface device between a standby mode at the reduced
12 power level and an operational mode at the full power level.

1 16. The device of claim 15, wherein the communications ports include an inductive port
2 configured to couple to an ignition system of the at least one vehicle, and the main processor
3 module is configured to measure revolutions per minute (RPM) of a vehicle engine as a function
4 of a signal received by the inductive port.

1 17. The device of claim 15, wherein the communications ports include a radio frequency
2 (RF) antenna port configured to couple to a high voltage portion of an ignition system of the at
3 least one vehicle, and the main processor module is configured to measure RPMs of a vehicle
4 engine as a function of a signal received by the RF port.

1 18. The device of claim 15, wherein the communications ports include an on-board
2 diagnostics (OBD) port configured to couple to an OBD device of the at least one vehicle, and
3 the main processor module is configured to measure RPM or other OBD signals of a vehicle
4 engine as a function of a signal received by the OBD port.

1 19. The device of claim 15, wherein the main processor module and the set of power
2 management modules are components mounted on a printed circuit board (PCB).

1 20. The device of claim 15, wherein the communication ports include one or more RS-232
2 ports, and the M/M device comprises a communication port processor configured for processing
3 messages and data related to the one or more RS-232 ports.

1 21. The device of claim 15, wherein the set of power management modules is configured to
2 power one or more external devices, including one or more of a display device, a personal digital
3 assistant, or the at least one vehicle diagnostic system.

1 22. The device of claim 15, wherein the at least one vehicle diagnostic system includes a
2 portable gas analyzer.

1 23. The device of claim 15, wherein the set of power management modules includes a battery
2 charger configured to charge at least one battery at a fast rate when the device is coupled to an
3 external power source that is of a voltage about equal to or greater than a voltage rating of the at
4 least one battery, and at a slow rate when the device is coupled to an external power source that
5 is of a voltage substantially less than the voltage rating of the at least one battery.

1 24. The device of claim 23, wherein the at least one battery includes an internal rechargeable
2 battery.

1 25. The device of claim 15, wherein the main processor module is configured to generate
2 analog signals from digital signals received from the one or more system ports, and to provide
3 the analog signals to at least one diagnostic port.

1 26. The device of claim 15, further comprising a monitor configured to monitor the
2 environmental conditions of the device and to adjust signals generated by the device in response
3 to at least one of the environmental conditions exceeding a threshold value.